

PRICE LIST

for

ASKANIA LARGE OPTICAL BENCH, Type Pob 125

(Testing Instrument for Objectives - Pamphlet E1308b)

List No.	Description	Price
1308/1	Basic equipment, consisting of: frame, collimator, prismatic rail, illumination equipment, section with swivel arm and objective holder	\$ 13,566.00
	<u>Auxiliary Apparatus:</u>	
1308/11	Hartmann instrument	5,560.00
1308/12	Swinging ground glass screen	236.00
1308/13	Supplementary equipment for determining the resolving power by means of test stars	230.00
1308/14	Equipment for contrast variation	3,000.00
1308/15	Wetthauer instrument	3,520.00
1308/16	Holder for microscope	164.00
1308/18	Porro instrument	4,500.00
1308/20	Osram-Mercury h.p. lamp HBO 200	103.00
1308/21	Osram-Sodium spectrum lamp	40.00
1308/22	Osram-Mercury spectrum lamp	40.00
1308/23	Osram-Cadmium spectrum lamp	40.00
1308/24	1 set of monochromatic filters in mounting 5 of these for Mercury light and 3 of these for Cadmium light	1,100.00
1308/25	Choking coil, range 0.4 to 5.0 amp., including ignition apparatus	724.00
1308/26	Opal bulb 200 v, 60 Watt	1.50
1308/27	Device for automatic opening and closing of the photo shutter	180.00
1308/28	Quadruple lamp house	1,730.00
1308/29	1 set (3 pieces) of choking coils, range 0.5 to 1.5 amp.	1,130.00
1308/30	Transformer	660.00
1308/31	Flash light with red filter	7.00
1308/32	Base frame on casters	985.00

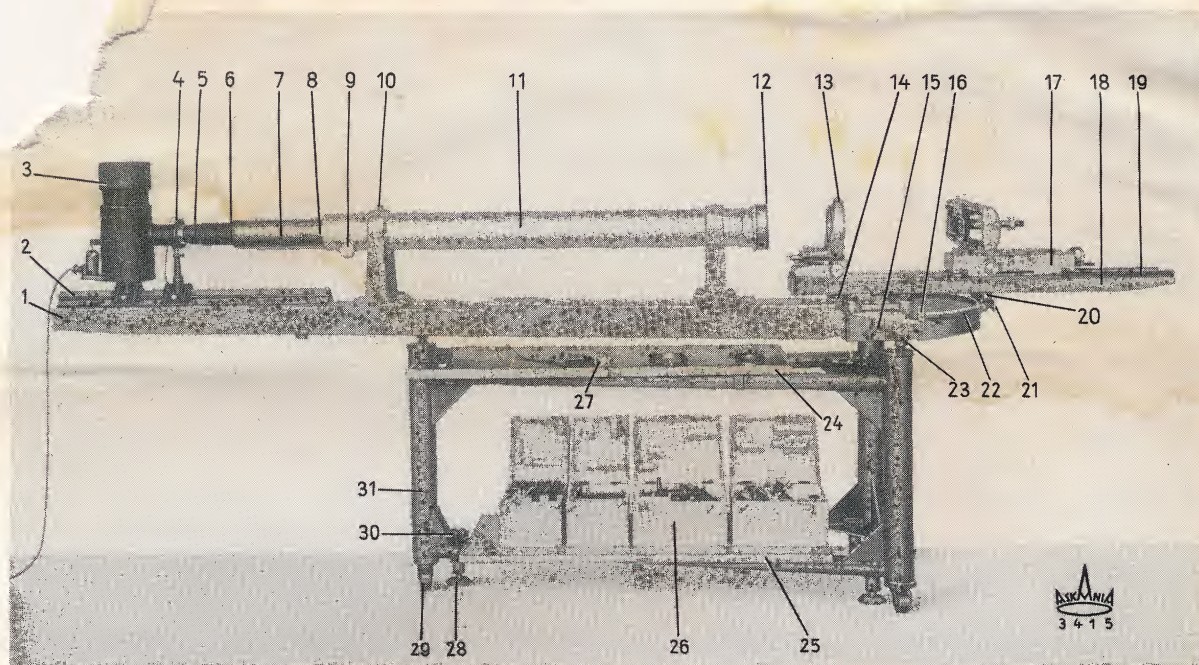
PRICES are quoted f.o.b. Bethesda, Maryland

DELIVERY: approx. 11 months ARO

TERMS: To be arranged

January 1964





The design and manufacture of modern precision optics more than ever requires precision testing methods for experiments with prototypes of new designs or for routine tests of objectives and optical components in series production.

It is no wonder therefore that the Askania large optical bench, for its precise construction and versatility, has found wide appeal with many research institutions and optical laboratories in various parts of the world.

## Application:

The Askania Testing Instrument for Objectives serves for testing telescope objectives as well as photographic objectives, i. e. for determining their geometric-optical image errors, resolving power and focal length. Depending upon the task at hand and the testing method applied, various auxiliary apparatus are used for the following tests:

- a) According to the Hartmann-method of testing objectives or the Wetthauer-method of the formation of images by grazing rays:

spheric aberration, chromatic aberration, deviation from the sinus condition, coma, astigmat-

ism, meridional and sagittal field-of-image curvature of objectives;

- b) according to the test star method: resolving power of objectives;
- c) according to the Porro-method: focal length of objectives.

The instrument is equipped for testing objectives up\*) to 125 mm. aperture and abt. 1000 mm. focal length. Also objectives with a very short focal length can be tested according to the above-mentioned methods.



## Construction

The instrument consists of the **basic equipment** and **auxiliary apparatus** required for the various tests. They may be mounted on the swivel arm of the frame. The overall length of the complete equipment is approx. 4 m. (13 $\frac{1}{3}$  ft.) and its overall width is approx. 1 m. (3 $\frac{1}{3}$  ft.). For setting up the instrument we supply a base frame on casters which can also be made to stand rigidly.

### Basic equipment (308/1)

The long frame (1) which can be levelled up by means of foot-screws carries the collimator (11), the illumination equipment on the prismatic rail (2), the sector (15) with mounted swivel arm (18), and the objective holder (13).

The collimator (11) has a triple-lens apochromatic objective (12) with 125 mm. aperture and 1875 mm. focal length as well as a draw-tube (7) with mounting for the respective test diaphragms (6), which is adjustable by means of rack and pinion.

The illumination equipment on the prismatic rail (2) consists of the light-tight lamp-house (3) with inserted opal-bulb, the condenser, the compound-shutter (4), and the filter box (5) for receiving the monochromatic filters.

At the end of the frame (1) the sector (15) is attached having a radius of abt. 500 mm., on which the swivel arm is arranged to turn on rollers about the axis (14) up to 50° in both directions with stops every 5°; its position may be read by the graduation on the outer rim of the sector by index to 1/3°.

The objective holder (13) serves for receiving the objective under test. Its standard rests on a slide which can be shifted by gear drive in the direction of the optical axis and can also be turned through  $\pm 50^\circ$  with stops every 5°. A rotatable ring inserted in the standard enables the objective under test to be turned about its axis with stops every 45°, for testing with variable azimuth.

### Auxiliary apparatus

#### Hartmann-Instrument (308/11)

The Hartmann-instrument (17) serves for photographic and visual determination of geometric-optical image errors. According to the Hartmann-method, the piercing height of several zonal rays through two different planes is determined, and the position of the vertex of the zonal rays with the axis or with the centre ray of the bundle is therefrom calculated.

The Hartmann-instrument consists mainly of the following parts:

- 1 **single-hole diaphragm** to be inserted in the collimator draw-tube;
- 6 **zonal diaphragms** to be attached optionally to the objective of the collimator;
- 1 **measuring slide** with 180 mm. displacement in the direction of the optical axis, operated by micrometer screw with 2 mm. pitch; reading on drum graduation to 0.01 mm.;

1 **frame** to be mounted with transverse movement collimator and the microscope by means of micrometer screws with stops every 10 mm.;

1 **magazine carrier** with vertical movement and having magazines for photographic plates 65×90 mm. (2 $\frac{1}{2}$ ×3 $\frac{1}{2}$  in.) and a mounted glass screen;

1 **microscope** for visual observation with a micrometer screw which may be used for measuring in the vertical;

1 **storage box** for collecting components of the Hartmann-instrument.

**Swinging ground glass screen (308/12)** arranged to swing in its plane, for avoiding the disturbing grain during microscopic observation.

### Supplementary equipment for determining the resolving power by means of test stars (308/13).

This equipment serves for visual and photographic determination of the resolving power of objectives by means of test stars, using the measuring slide with the visual and photographic equipment of the Hartmann-instrument. It consists of the following test diaphragms to be attached in the focal plane of the collimator:

- 1 **large test star** for testing of short-focus objectives;
- 1 **small test star** for testing of long-focus objectives;
- 3 **test stars**, side by side, for testing of long-focus objectives within the axis and simultaneously outside of the axis;
- 1 **field-of-view diaphragm**, releasing only a small opening during visual adjustment for protecting the plate from inadvertent exposure.

### Equipment for contrast variation (308/14).

A second illumination equipment mounted on a prismatic rail, with lamp house, filter housing, and condenser serves to vary at will the contrast of the test plates (e.g. test stars) when testing the resolving power. It is attached at an angle to the collimator draw-tube so that additional light may be conducted into the ray path via an optical flat in the collimator. The contrast is made variable by the insertion of filters.

### Wetthauer instrument (308/15).

The Wetthauer instrument serves for determining the geometric-optical image errors, the light striking the photo plate at a slight angle by means of a slot in the focal plane of the collimation objective. From the pencil two plane beams of light are segregated by means of the zonal diaphragm.

In this way two beams, each one imaging the slot, are emitted from the two released zonal points of the objective under test. These beams produce one track each on a photoplate inclined at 10°. The vertex of the said two tracks corresponds to the image point. The straying of the image point during the change of zones is the aberration sought. Already at first sight of the photograph one obtains a



# ASKA TEST

...ding the state of correct-  
...after whether spherical or  
...stigmatic setting difference,  
...ature are concerned.

...consist of:

...ragms with 3 vertical slots side by side  
...length and width;

...ms with 3 vertical slots side by side  
...ntal slots;

...d 4 conal diaphragms of different  
...be attached optionally to the  
...collimator;

1 **plate holder** mounted on the swivel arm, with the  
plate table tilted at  $10^\circ$  which can be moved transversely  
to the optical axis by means of screw spindle, with  
stops every 0.5 mm. Size of plates:  $60 \times 300$  mm. or  
 $65 \times 300$  mm. ( $2\frac{1}{4} \times 12$  or  $2\frac{1}{2} \times 12$  in.); Insert frame  
for plates  $45 \times 60$  mm ( $1\frac{3}{4} \times 2\frac{1}{4}$  in.);

1 **box for storing** the selector dials;

1 **box for storing** the smaller components of the  
Wetthauer instrument.

**Holder for microscope** (308/16) for focussing the  
image on the Wetthauer photoplate (the microscope  
of the Hartmann instrument is used here). The  
microscope stands horizontally and parallel to the  
Wetthauer plate; a  $90^\circ$  prism is attached to the  
end of the objective.

## Porro-instrument (308/18).

The Porro-instrument serves for determining the  
focal length. The size of image of an infinitely  
distant object is measured in the image plane of the  
specimen by means of an eyepiece screw-micro-  
meter; the focal length is then calculated from this  
measurement.

The Porro-instrument consists of:

1 **test plate** with 6 pairs of lines, to be inserted in  
the focal plane of the collimator;

1 **eyepiece screw-micrometer** with support, mono-  
centric eyepiece, and cross slide with slow motion,  
mounted on a slide with coarse run, placed on the  
swivel arm;

1 **microscope** rotatable through its optical axis,  
with interchangeable objective,  $f = 70$  mm., ( $1 \times$   
magnification) and  $f = 200$  mm. ( $0.5 \times$  magni-  
fication), for determining the focal length of  
objectives with shortest distance from back lens to  
image, of negative lenses, of objectives with large  
aperture ratio as well as for measuring the free  
aperture of objectives;

1 **ground glass screen** suspended to swing in its  
plane, to be attached to the universal rider, for

determining the focal length of objectives with large  
aperture ratio;

1 **box for storing** the Porro-instrument.

**Osram-Mercury vapor h.p. lamp, type HBO 200**  
(308/20) for universal current.

**Osram-Sodium spectrum lamp** (308/21) for A.C.

**Osram-Mercury spectrum lamp** (308/22) for A.C.

**Osram-Cadmium spectrum lamp** (308/23) for A.C.

**Set of monochromatic filters** (308/24) in mounting;  
5 filters for Mercury light for segregating the wave  
lengths 436, 492, 546, 577/79, and 691 m $\mu$ ., as well  
as 3 filters for Cadmium light for segregating the  
wave lengths 468/80, 509, and 640 m $\mu$ ., packed in  
a box for storing.

**Choking coil** (308/25) for tuning the lamps 308/20  
to 23, with variable air gap (range 0.4 to 5.0 amp.),  
with ignition inductor for the lamp HBO 200,  
ammeter, cut-out switch and fuses, installed in a  
housing.

**Opal-bulb** (308/26) 220 Volt, 60 Watt, Edison  
socket 27.

**Device for automatic opening and closing of the  
photo-shutter** (308/27) with variable timing from  
 $\frac{1}{2}$  min. to 30 min., with timing switch and magnet.

**Quadruple lamp-house** (308/28), rotatable, with  
4 chambers (in place of the lamp house with only  
1 chamber) for quick change of light of the various  
wave lengths, containing the adjustable lamp sockets  
for 1 Mercury h.p. lamp, 2 spectrum lamps, 1 opal  
bulb, and 1 spare lamp socket for exchanging of  
the opal bulb with a spectrum lamp; automatic cut-  
out device for the Mercury h.p. lamp.

**Set (3 pieces) of choking coils** (308/29) with variable  
air gap for simultaneous operation of 3 spectrum  
lamps, installed in a quadruple lamp house, for a  
range of 0.5 to 1.5 amp. each.

**Transformer** (308/30) required for a voltage higher  
or lower than 220 V, for a load of 7.5 amp. max.,  
with commutator, installed in a housing, with leads  
and wall socket.

**Flash light** (308/31) with dry battery of 2.5 V, pro-  
vided with red filter for illuminating the reading  
spots.

**Base frame** (308/32) for placing the Testing Instru-  
ment for Objectives at a convenient working height,  
made of welded steel tubing with sturdy pillars on  
casters, with 3 footscrews for rigid erection, also  
two table plates.



# Recapitulation: Testing Instrument for Objectives Pob 125.

List No.	Subject	Weight kg	List No.	Subject	Weight kg
308/1	<b>Basic equipment:</b> frame, collimator, prismatic rail, illumination equipment, sector with swivel arm and objective holder ..	300	308/20	Osram-Mercury h.p. lamp HBO 200	0.1
	<b>Auxiliary apparatus:</b>		308/21	Osram-Sodium spectrum lamp ..	0.05
308/11	Hartmann-instrument . . . . .	30	308/22	Osram-Mercury spectrum lamp ..	0.05
308/12	swinging ground glass screen . . . . .	0.3	308/23	Osram-Cadmium spectrum lamp ..	0.05
308/13	supplementary equipment for de- termining the resolving power by means of test stars . . . . .	0.5	308/24	1 set of monochromatic filters in mounting, 5 of these for Mercury light and 3 for Cadmium light . . .	2
308/14	equipment for contrast variation ..	10	308/25	Choking coil, range 0.4 to 5.0 amp., including ignition apparatus .. .	12
308/15	Wetthauer instrument . . . . .	27	308/26	Opal bulb 220 V, 60 Watt . . . . .	0.05
308/16	holder for microscope . . . . .	0.3	308/27	device for automatic opening and closing of the photo shutter . . .	0.8
			308/28	quadruple lamp house . . . . .	8
308/18	Porro instrument . . . . .	11	308/29	1 set (3 pieces) of choking coils, range 0.5 to 1.5 amp. . . . .	30.6
			308/30	transformer . . . . .	26
			308/31	flash light with red filter . . . . .	0.5
			308/32	base frame on casters . . . . .	113

For testing of mirror lenses of  
1000 mm focal length, a testing  
instrument type Pob 150 having  
an aperture of 150 mm can be  
supplied. Details upon request.



Subject to change without notice

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